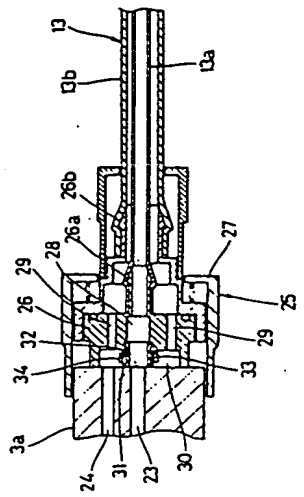
(54) AIR AND WATER SENDING DEVICE FOR ENDOSCOPE
(11) 2-60625 (A) (43) 1.3.1990 (19) JP
(21) Appl. No. 63-210579 (22) 26.8.1988
(71) FUJI PHOTO OPTICAL CO LTD (72) MITSUO KONDO(1)
(51) Int. Cl⁵. A61B1/00

PURPOSE: To jet the mixed fluid of a washing liquid and air with sufficient pressure by fitting a check valve to make the air flow from the side of a tank pressuring piping to the side of a washing liquid supplied path from a washing liquid tank for the communicating part between the tank pressuring piping and the washing liquid supplying path.

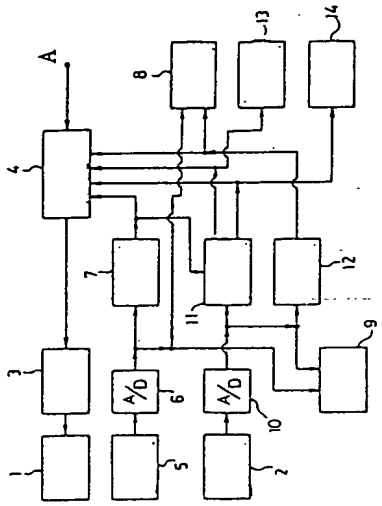
CONSTITUTION: A liquid passage 28 is drilled for the internal part of an internal tube connecting part 26a so that the passage 28 can penetrate a connecting part body 26, plural air passages 29, one edges of which communicate with an external tube connecting part 26b, are provided for the outside of the liquid passage 28, and the other edges of the air passages 29 communicate with an annulus air chamber 30. Further, notches are provided for one part of the wall part between the annulus air chamber 30 and the liquid passage 28, and a communicating path 31 to make the notches communicate with each other is formed. A check valve 32 obtained by forming an elastic member into a cylinder shape is fitted to the internal part of the liquid passage 28, and the check valve 32 permits an airflow from the side of the annulus air chamber 30 to the side of the liquid passage 28 and prevents the flow of the washing liquid from the side of the liquid passage 28 to the side of the annulus air chamber 30.



(54) HEAD BLOOD PRESSURE MEASURING EQUIPMENT
(11) 2-60627 (A) (43) 1.3.1990 (19) JP
(21) Appl. No. 63-211337 (22) 25.8.1988
(71) AKAI ELECTRIC CO LTD (72) KOKICHI TERAJIMA
(51) Int. Cl⁵. A61B5/022,A61B5/0225

PURPOSE: To easily decide whether a cuff and a pulse wave detecting means are abutted on appropriate positions on an artery or not by increasing cuff pressure up to reference pressure and increasing the cuff pressure until the extinction of the amplitude of a pulse wave is detected when the amplitude of the pulse wave is reference amplitude or above.

CONSTITUTION: A cuff pressure control means 4 drive-controls a pump 3, when cuff pressure P by a cuff 1 reaches reference pressure P_0, the increase of the cuff pressure P is temporarily stopped, amplitude V of the pulse wave is compared with reference amplitude V_0, and when the amplitude V is lower than the reference amplitude V_0, the cuff pressure control means 4 inversely drive-controls the pump 3 and pressure-reduces the cuff pressure P, and a person to be inspected arbitrarily dislocates the positions of the cuff 1 and a pulse wave detecting means 2 and restarts the inspection. When the cuff 1 and the pulse wave detecting means 2 are abutted on the appropriate positions by trial-and-error in this manner, the amplitude V of the pulse wave becomes the reference amplitude V_0 or above. At that time, it is informed to the person to be inspected that the pulse wave can be properly detected. The cuff pressure control means 4 further increases the cuff pressure P and stops the increase of the cuff pressure P when the extinction of the amplitude V of the pulse wave is detected, and blood pressure is measured from cuff pressure Pcs from which the amplitude V of the pulse wave is extinct.

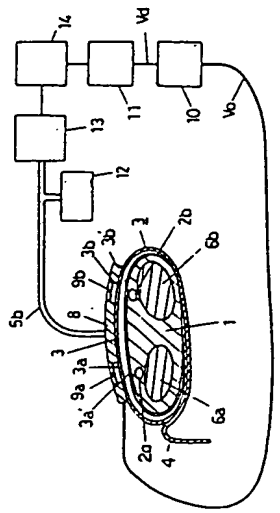


5: cuff pressure detecting means, 9: display means, 7: cuff pressure reference comparing means, 11: pulse wave amplitude reference comparing means, 12: pulse wave annihilation detecting means, 8: blood pressure measuring means, 13: pulse wave detection informating means, 14: caution means, A: start signal

(54) BLOOD PRESSURE MEASURING EQUIPMENT
(11) 2-60628 (A) (43) 1.3.1990 (19) JP
(21) Appl. No. 63-212960 (22) 26.8.1988
(71) MATSUSHITA ELECTRIC WORKS LTD (72) HARUHIRO TERADA
(51) Int. Cl⁵. A61B5/022,A61B5/0245

PURPOSE: To prevent the positional dislocation of a cuff band and to minimize the occurrence of an error in measuring blood pressure by arranging a pulse detecting sensor in accordance with a position in the cuff band on which at least either a radial artery or an ulnar artery abuts and deciding the positional dislocation of the cuff band based on the output of the pulse detecting sensor.

CONSTITUTION: Artery abutting parts 3a, 3a', 3b, and 3b' in a cuff band 3 are made translucent, photoelectric pulse wave detecting sensors 9a and 9b composed of a light emitting element composed of a photodiode and a light receiving element composed of a phototransistor are arranged in accordance with the artery abutting parts 3a, 3a', 3b, and 3b', and a pulse wave is detected. When a pulse wave level goes to a prescribed level or below, and a positional dislocation detected signal Vd is outputted from a positional dislocation deciding means 10, a positional dislocation display is displayed on a display device 11. Artery oppression caused by the cuff band 3 is controlled by a pressing and pressure reducing device 12, cuff pressure, on which the pulse wave is superimposed, is detected by a pressure sensor 13, the maximum and the minimum blood pressure are decided by an arithmetic unit 14 based on the output of the pressure sensor 13, and the decided result is displayed on the display device 11.



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8932−4C　3 1 0 N

審査請求　未請求　請求項の数 1　(全4頁)

⑤4発明の名称　血圧測定装置

⑳特　願　昭63−212960
㉒出　願　昭63(1988)8月26日

⑦2発明者　寺田　晴博　大阪府門真市大字門真1048番地　松下電工株式会社内
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明　細　書

1．発明の名称

血圧測定装置

2．特許請求の範囲

(1)手首に巻装されたカフ帯により橈骨動脈や尺骨動脈を圧迫、阻血し、その過程で得られる動脈音や脈動に基づいて血圧を測定するようにした血圧測定装置において、上記カフ帯の少なくとも橈骨動脈または尺骨動脈のいずれかが当接される位置に対応して脈波検出センサを配置し、脈波検出センサ出力に基づいてカフ帯の位置ずれを判定する位置ずれ判定手段を設けたことを特徴とする血圧測定装置。

3．発明の詳細な説明

[産業上の利用分野]

本発明は、手首にカフ帯を巻装して血圧を測定する血圧測定装置に関するものである。

[従来の技術]

従来、この種の血圧測定装置のカフ帯3は、第6図に示すように、上腕に巻装する一般的なカフ帯よりも小型のものであり、面状ファスナー4によって手首1に巻装固定されるようになっており、カフ帯3内の阻血袋にノズル5aおよびパイプ5bを介して空気を圧送して加圧するとともに、ノズル5aおよびパイプ5bを介して排気するようになっている。ここに、血圧測定は、橈骨動脈2aや尺骨動脈2bを圧迫、阻血する過程で発生する動脈音や脈動などを捕捉して血圧判定を行う間接測定法によって行われる。

[発明が解決しようとする課題]

しかしながら、上述の従来例にあっては、カフ帯3の装着位置がずれることによる血圧測定誤差が発生し易いという問題があった。すなわち、手首1には、第6図に示すように、橈骨6a、尺骨6bがあり、しかも内側中央部の表面には腱7が集中している。カフ帯3は、このような複雑な構造の中にある両動脈2a，2bの上に適切に当接して両動脈2a，2bを圧迫する必要があるが、第6図に矢印で示すようにカフ帯3が手首1の周方向にずれて装着されると、圧迫不足となって血

圧測定誤差が生じるという問題があった。なお、周方向の位置ずれの許容値は２０～５０ｍｍである。

本発明は上記の点に鑑みてなされたものであり、その目的とするところは、カフ帯の位置ずれを防止して血圧測定誤差が生じ難くすることができる血圧測定装置を提供することにある。

〔課題を解決するための手段〕

本発明の血圧測定装置は、手首に巻装されたカフ帯により橈骨動脈や尺骨動脈を圧迫、阻血し、その過程で得られる動脈音や脈動に基づいて血圧を測定するようにした血圧測定装置において、上記カフ帯の少なくとも橈骨動脈または尺骨動脈のいずれかが当接する位置に対応して脈波検出センサを配置し、脈波検出センサ出力に基づいてカフ帯の位置ずれを判定する位置ずれ判定手段を設けたものである。

〔作　用〕

本発明は上述のように構成されており、手首にカフ帯を巻装して血圧を測定する血圧測定装置において、カフ帯の少なくとも橈骨動脈または尺骨動脈のいずれかが当接される位置に対応して脈波検出センサを配置し、脈波検出センサ出力に基づいてカフ帯の位置ずれを判定する位置ずれ判定手段を設けたものであり、カフ帯の位置ずれを防止して血圧測定誤差が生じ難くすることができるようになっている。

〔実施例〕

第１図は本発明一実施例を示すもので、手首１に巻装されたカフ帯３により橈骨動脈２ａや尺骨動脈２ｂを圧迫、阻血し、その過程で得られる動脈音や脈動に基づいて血圧を測定するようにした血圧測定装置において、上記カフ帯３の少なくとも橈骨動脈２ａまたは尺骨動脈２ｂのいずれかが当接される位置に対応して脈波検出センサ９ａ，９ｂを配置し、脈波検出センサ９ａ，９ｂ出力に基づいてカフ帯３の位置ずれを判定する位置ずれ判定手段１０を設けたものである。実施例にあっては、脈波検出センサ９ａ，９ｂは、センサブロック８として一体化されてカフ帯３の動脈当接部分に取着されている。なお、脈波検出センサ９ａ，９ｂはいずれか一方だけ設けても良いことは言うまでもない。

第２図は具体例を示すもので、カフ帯３の動脈当接部分３ａ，３ａ′，３ｂ，３ｂ′を半透明とし、フォトダイオードよりなる投光素子とフォトトランジスタよりなる受光素子とで構成される光電式脈波検出センサ９ａ，９ｂを動脈当接部分３ａ，３ａ′，３ｂ，３ｂ′に対応して配置し、脈波を検出するようにしたものであり、脈波レベルが所定レベル以下になって位置ずれ判定手段１０から位置ずれ検知信号Ｖｄが出力されたとき、表示装置１１にて位置ずれ表示を行うようになっている。図中、１２は加減圧装置、１３は圧力センサ、１４は演算装置であり、加減圧装置１２にてカフ帯３による動脈圧迫を制御し、圧力センサ１３にて脈波が重畳されたカフ圧を検出し、演算装置１４にて圧力センサ１３出力に基づいて最高、最低血圧を判定し、表示装置１１に表示させるようになっている。

第３図は他の具体例を示すもので、カフ帯３の手首側面の動脈当接位置周辺部３ａ′，３ｂ′を部分的に鏡面とし、両動脈２ａ，２ｂの拍動を光電式脈波検出センサ９ａ，９ｂにて検出するようにしてものである。

第４図はさらに他の具体例を示すもので、脈波検出センサ９ａ′，９ｂ′としてドップラ式超音波センサを用い、両動脈２ａ，２ｂの拍動に伴うカフ帯３内面の拍動を検出するものであり、ドップラ式超音波センサの発振周波数は、距離計や障害物センサに用いられている周波数と同様の低い周波数（５０ｋＨｚ程度）に設定されている。

第５図は、位置ずれ判定手段１０の具体例を示すもので、脈波検出センサ９ａ，９ｂあるいは９ａ，９ｂの出力Ｖｏをセンサインターフェース１０ａにてインピーダンス変換およびレベル変換し、このセンサインターフェース１０ａ出力Ｖｏ′をコンパレータ１０ｂの比較入力端子（マイナス端子）に入力して正常レベルの脈波が得られているかの判定を行うようになっている。コンパレータ

１０ｂの基準入力端子（プラス端子）には、ボリューム１０ｃにて予め設定された判定基準値Ｖｓが入力されており、センサインターフェース出力Ｖｏ′が判定基準値Ｖｓよりも低くなったとき、コンパレータ１０ｂ出力が“Ｈ”になって位置ずれ検知信号Ｖｄが出力されるようになっている。この位置ずれ検知信号Ｖｄによって表示装置１１に位置ずれ表示が行われる。したがって、この位置ずれ表示によりカフ帯３が正常に装着されていないことが認識され、カフ帯３の装着位置を修正することにより、カフ帯３の装着位置のずれによる血圧測定誤差の発生を防止できることになる。

〔発明の効果〕

本発明は上述のように構成されており、手首にカフ帯を巻装して血圧を測定する血圧測定装置において、カフ帯の少なくとも橈骨動脈または尺骨動脈のいずれかが当接される位置に対応して脈波検出センサを配置し、脈波検出センサ出力に基づいてカフ帯の位置ずれを判定する位置ずれ判定手段を設けたものであり、カフ帯の位置ずれを防止して血圧測定誤差が生じ難くすることができるという効果がある。

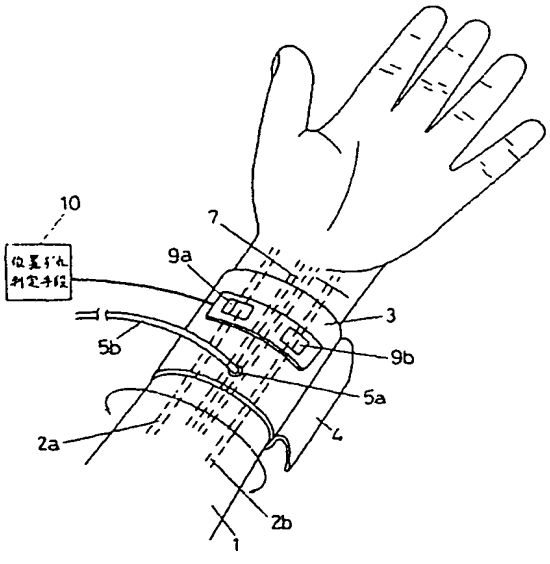
４．図面の簡単な説明

第１図は本発明一実施例の要部概略構成図、第２図は同上の具体例を示す要部概略構成図、第３図は他の具体例を示す要部概略構成図、第４図はさらに他の具体例を示す要部概略構成図、第５図は同上の要部具体回路図、第６図は従来例の概略構成図である。

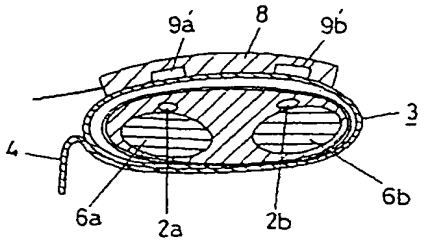
１は手首、２ａ、２ｂは動脈、３はカフ帯、９ａ、９ｂは脈波検出センサ、１０は位置ずれ判定手段である。

代理人　弁理士　石　田　長　七

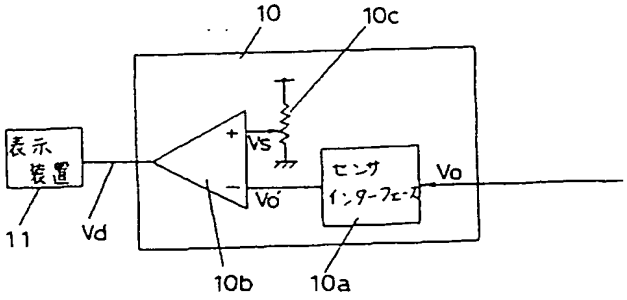
第１図



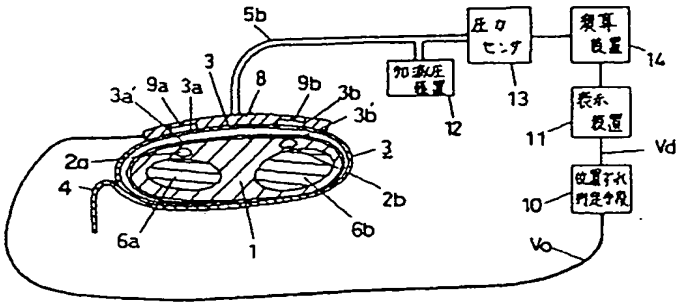
第４図



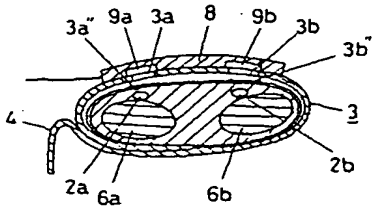
第５図



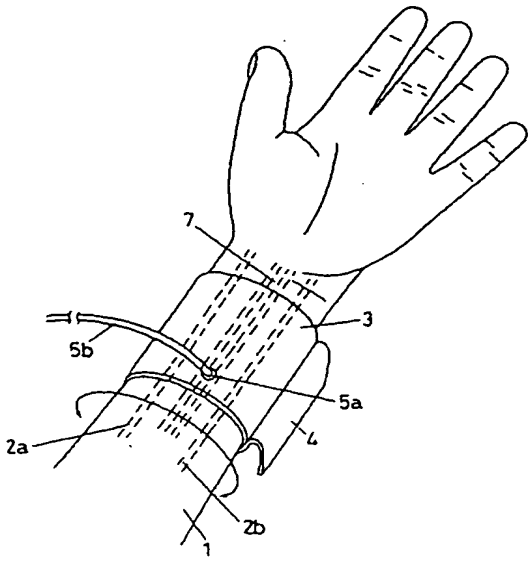
第 2 図


5b
圧力センサ
減算装置
14
3
3a
9a
3a
8
9b
3b
3b
加減圧装置
13
12
表示装置
11
Vd
2a
3
4
2b
位置状態判定手段
10
6a
1
6b
Vo

第 3 図


3a
9a
3a
8
9b
3b
3b
3
4
2b
2a
6a
6b

第 6 図


7
3
5b
5a
4
2a
2b
1

JAPANESE PATENT APPLICATION, FIRST PUBLICATION NO. HEI 2-60628

Int. Cl.[5]: A61B 5/022
5/0245

Publication Date: March 1, 1990

APPLICATION NO.: Sho 63-212960
FILING DATE: August 26, 1988
APPLICANT: MATSUSHITA DENKO KK
INVENTORS: Haruhiro TERADA

TITLE: Blood Pressure Measuring Device

CLAIM

1. A blood pressure measuring device for measuring blood pressure by constricting the radial artery and ulnar artery by means of a cuff band wound around the wrist, stopping blood flow, and measuring arterial noise and pulsations obtained by this procedure; characterized by positioning a pulse detecting sensor so as to correspond to a position which contacts at least one of a ulnar artery or radial artery on said cuff band, and providing displacement discriminating means for discriminating displacement of the cuff band based on an output of the pulse detecting sensor.

DETAILED DESCRIPTION OF THE INVENTION

Field of Industrial Application

The present invention relates to a blood pressure measuring device for measuring blood pressure by winding a cuff band around the wrist.

Prior Art

Conventionally, cuff bands 3 of blood pressure measuring devices of this type as shown

in Fig. 6 are smaller than the cuff bands usually used on the upper arm, are wound and affixed to the wrist 1 by a planar fastener 4. Pressurized air is sent through a nozzle 5a and pipe 5b to a blood stopping bag inside the cuff band 3 to apply pressure, and air is also exhausted through the nozzle 5a and pipe 5b. Here, the blood pressure measurement is performed by a indirect measuring method of determining the blood pressure by taking the arterial noise and pulsation which occur during constriction and blood stoppage in the radial artery 2a and ulnar artery 2b.

Problems to be Solved by the Invention

However, the above-described conventional example has the problem that blood measurement errors tend to occur due to slipping of the position at which the cuff band 3 is worn. That is, as shown in Fig. 6, the radius 6a and ulna 6b exist at the wrist 1, and there are many tendons 7 on the surface of the inner central portion. While the cuff band 3 is required to be in appropriate contact above both arteries 2a and 2b to constrict both arteries 2a, 2b inside such a complicated structure, if the cuff band 3 is worn slightly shifted in the circumferential direction of the wrist 1 as indicated by the arrow in Fig. 6, the constriction is insufficient so that blood pressure measurement errors occur. The allowable range for displacement in the circumferential direction is 20-50 mm.

The present invention has been achieved in view of the above-described points, and has the object of offering a blood pressure measuring device capable of preventing displacement of the cuff band so as to make it difficult for blood pressure measurement errors to occur.

Means for Solving the Problems

The present invention is a blood pressure measuring device for measuring blood pressure by constricting the radial artery and ulnar artery by means of a cuff band wound around the wrist, stopping blood flow, and measuring arterial noise and pulsations obtained by this procedure; characterized by positioning a pulse detecting sensor so as to correspond to a position which contacts at least one of an ulnar artery or radial artery on said cuff band, and providing displacement discriminating means for discriminating displacement of the cuff band based on an output of the pulse detecting sensor.

Functions

The present invention has the above-described structure, and in a blood pressure measuring device for measuring blood pressure by wrapping a cuff band around the writs, a pulse sensor is positioned so as to correspond to a position which contacts at least one of an ulnary artery or radial artery on the cuff band, and displacement

discriminating means is provided for discriminating displacement of the cuff band based on the output of the pulse detecting sensor, and blood pressure measuring errors are made unlikely to occur by preventing displacement of the cuff band.

Embodiments

Fig. 1 shows a first embodiment of the present invention, which is a blood pressure measuring device for measuring blood pressure by constricting the radial artery 2a and ulnar artery 2b by means of a cuff band 3 wound around the wrist 1, stopping blood flow, and measuring arterial noise and pulsations obtained by this procedure; wherein pulse detecting sensors 9a, 9b are positioned so as to correspond to positions which contact at least one of the ulnar artery 2b or radial artery 2a on said cuff band 3, and a displacement discriminating means 10 is provided for discriminating displacement of the cuff band 3 based on outputs of the pulse detecting sensors 9a, 9b. In this embodiment, the pulse detecting sensors 9a, 9b are integrated as a sensor block 8, and attached to artery contacting portions of the cuff band 3. Of course, it is also possible to provide only one of the pulse detecting sensors 9a, 9b.

Fig. 2 shows a detailed example, wherein the artery contacting portions 3a, 3a', 3b and 3b' of the cuff band 3 are made semi-transparent, photoelectric pulse detecting sensors 9a, 9b comprising a light emitting element composed of a photodiode and a light receiving element composed of a phototransistor are provided at positions corresponding to artery contacting portions 3a, 3a', 3b, 3b', in order to detect the pulse, and when a displacement detection signal Vd is output from the displacement discriminating means 10 due to the pulse level being less than a predetermined level, a display device 11 performs a displacement display. In the drawing, reference numeral 12 denotes a pressurizing/depressurizing device, 13 denotes a pressure sensor and 14 denotes a processing device. The arterial constriction due to the cuff band 3 is controlled by the pressurizing/depressurizing device 12, the cuff pressure with the pulse superimposed is detected by the pressure sensor 13, a maximum and minimum blood pressure are determined by the processing device 14 based on the output of the pressure sensor 13, and the result is displayed on the display device 11.

Fig. 3 shows another detailed example, wherein the artery contacting position peripheral portions 3a", 3b" on the side surface of the wrist of the cuff band 3 are made partially mirror surfaces, and the pulsations of both arteries 2a, 2b are detected by the photoelectric pulse detecting sensors 9a, 9b.

Fig. 4 shows a further detailed example, wherein doppler type ultrasonic sensors are used as the pulse detecting sensors 9a', 9b' to detect the pulsations on the inner surface of the cuff band 3 caused by the pulsations of the arteries 2a, 2b. The oscillation frequency of the doppler type ultrasonic sensors is set to a low frequency (around 50 kHz) similar to the frequencies used in range finders and obstacle sensors.

Fig. 5 shows a detailed example of the displacement discriminating means 10, wherein the pulse detecting sensors 9a, 9b or the outputs Vo of 9a, 9b are impedance converted and level converted by a sensor interface 10a, and the output Vo of this sensor interface 10a is input to a comparison input element (negative terminal) of a comparator 10b to determine whether a pulse of a normal level has been obtained. A discriminating reference value Vs preset by a volume 10c is input to the reference input terminal (positive terminal) of the comparator 10b. When the sensor interface output Vo' is less than the discriminating reference value Vs, then the output of the comparator 10b become "H" so that a displacement sensing signal Vd is output. A displacement is displayed at the display device 11 due to this displacement sensing signal Vd. Therefore, by recognizing that the cuff band is not being worn properly due to this displacement display, and correcting the position on which the cuff band 3 is worn, the occurrence of blood pressure measurement errors due to displacement of the cuff band can be prevented.

Effects of the Invention

Due to the structure described above, the present invention is a blood pressure measuring device for measuring blood pressure by constricting the radial artery and ulnar artery by means of a cuff band wound around the wrist, stopping blood flow, and measuring arterial noise and pulsations obtained by this procedure; characterized by positioning a pulse detecting sensor so as to correspond to a position which contacts at least one of a ulnar artery or radial artery on said cuff band, and providing displacement discriminating means for discriminating displacement of the cuff band based on an output of the pulse detecting sensor, as a result of which displacement of the cuff band is prevented so as to make it difficult for blood pressure measurement errors to occur.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic diagram showing the structure of the principal portions of an embodiment of the present invention. Fig. 2 is a schematic diagram showing the structure of a detailed example of the same. Fig. 3 is a schematic diagram showing the structure of the principal portions of another embodiment of the present invention. Fig. 4 is a schematic diagram showing the structure of the principal portions of still another embodiment of the present invention. Fig. 5 is a detailed circuit diagram of the principal portions of the same. Fig. 6 is a schematic diagram showing the structure of a conventional example.

1 denotes a wrist; 2a and 2b denote arteries; 3 denotes a cuff band; 9a and 9b denote artery detecting sensors; 10 denotes displacement discriminating means.